The Mountain Weather Journal

Spring 2007 Edition

What's New At Jackson, Kentucky??

By: Shawn Harley
Meteorologist-in-Charge

Greetings from your friends and neighbors at the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Forecast Office in Jackson, Kentucky. I want to bring you up to date on new aviation forecast services we are providing, recent webpage upgrades, and the new Enhanced Fujita Scale.

If you are a pilot you are well aware that the National Weather Service provides official Terminal Aerodrome Forecasts (TAFs) for many airports across the United States. The Jackson National Weather Service Forecast Office issues TAFs for the airports at Jackson, London and Somerset. The Jackson office is also now providing a new service by which a pilot can obtain a forecast for 19 other airports located in our 33 county service area. The new service is made possible by utilizing the digital forecast database that our staff prepares and keeps updated throughout the day and night. A pilot can now click on "Aviation" in the menu on the left hand side of our main web page and go directly to our new aviation web page. At this site there is a map where you can click on any airport in eastern Kentucky. If an official TAF is produced for the airport that will be displayed, but if an official TAF is not produced an experimental graphical forecast will be displayed instead. The graphical forecast will show hourly forecast data for that particular airport, including forecasts for ceilings and visibility. While visiting the aviation web site you can also read the latest aviation forecast discussion produced by the Jackson Forecast Office, and link directly to the national Aviation Weather Center web page. The address for the enhanced aviation web page is:
http://www.crh.noaa.gov/jkl/?n=aviation

Other recent web page enhancements include upgrades to the Jackson National Weather Service pages for "Watches/ Warnings" and "Outlooks". These have been designed to provide you with an effective self briefing tool that can be used to learn about the latest weather threats for your area. Links to both of these web pages can be found near the top of the left hand menu on our main web page. On the Outlooks page you'll find the latest Hazardous Weather Outlook, and information about severe weather, heavy rainfall, flooding, winter weather, and fire weather. The direct link for this page is:
http://www.crh.noaa.gov/jkl/?n=outlooks

On the "Watches/Warnings" page you'll find information about watches and warnings in effect for your area, as well as links to local and national storm reports, radar and satellite images, and weather safety information. The direct link for this page is:
http://www.crh.noaa.gov/hazards/jkl

Finally, I want to provide you with some background information on the Enhanced Fujita (EF) scale which was implemented nationwide on February 1. Like the original Fujita (F) scale, the EF scale is used to rate the intensity of tornadoes on a scale from zero to five. However, the new scale provides a much better estimate of the actual wind speed that occurred in a given tornado. The EF scale incorporates more damage indicators and degrees of damage than the original Fujita scale, and allows for more detailed analysis and better correlation between damage and wind speeds. The EF scale was developed by the Texas Tech University Wind Science and Engineering Research Center, along with a forum of wind engineers, other universities, private companies, government organizations, private sector meteorologists, and NOAA meteorologists.

The EF scale rating system was put to use in south central and southeast Kentucky following the April 3 severe weather outbreak. Five tornadoes occurred in the Jackson service area during that event, with two in Pulaski County, one in Laurel County, and two in Harlan County. The tornadoes in Pulaski and Laurel Counties were rated EF1, while the tornadoes in Harlan County were rated EF0.

As always, we would appreciate hearing from you. If you have any comments regarding our webpage or the services we provide please give us a call, send us an email, or drop us a note. We are constantly striving to improve our products and services and your feedback is important to us.

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Did You Know? Lightning Through the Ages

By: Bonnie Terrizzi
Hydrometeorological Technician

Throughout the history of man, perhaps one of the greatest of the weather related fears came from the sky – lightning. Powerful enough to kill, to start terrible fires; its retribution seemed so severe that the thunderbolt could only have come from the Gods. The only intention of such a terrible force had to be the punishment of man for his wrongdoing. And so, man invented stories to explain how lightning came to be.

Perhaps the most famous of the wielders of the thunderbolt was the Greek God Zeus. Supreme among the gods, Zeus, ruling from his court on Mt. Olympus, was the symbol of power, rule, and law. As the father god and the upholder of morality, he rewarded the good and punished the evil. The root meaning of Zeus is "bright" or "sky," so in this sense, he was also the god of weather and fertility. Thus he was worshiped in connection with almost every aspect of life. Zeus punished wayward mortals and miscreant gods by hurling thunderbolts at them. Other sky deities from many of the world's early religions included Zeus's Roman counterpart Jupiter, the Germanic Thor, the Mayan Chac, and the Slavic Perun, all who used the thunderbolt as the paramount symbol of power and punishment.

By the time the Middle Ages rolled around, civilized man knew that lightning was not the instrument of mythological gods, but were still very unsure about its origin. They also knew that lightning was something to avoid, and many charms and amulets were developed to protect people from such danger.

A prevalent belief to protect the town from lightning dangers during the Middle Ages was with the ringing of church bells. The ringing was believed to diffuse lightning with the Grace of God, and many medieval bells were engraved with the words, *Fulgura frango* ("I break up the lightning"). A medieval scholar observed that over a 33-year period, there were 386 lightning strikes on church towers and 103 fatalities among bell ringers, which totally discredited that theory.

By the time we reach modern man, it took the wit and wisdom of Mark Twain to properly define the relationship that man felt toward lightning.

According to Mr. Twain, "*The fear of lightning is one of the most distressing infirmities a human being can be afflicted with. It is mostly confined to women, but now and then you find it in a little dog, and sometimes a man.*"

Mr. Twain also observed that: *Thunder is good, thunder is impressive; but it is lightning that does the work.* And even today, it is doubtful that anyone would dispute those words of wisdom.

For information as to what you can do today that will actually help to protect your life and family from lightning dangers, please visit the National Weather Service Internet web site at: www.weather.gov and follow the education link on the left banner.

Storm of the Season

By: Brian Schoettmer
Meteorological Intern

April 3rd 2007 Severe Weather Outbreak in Eastern Kentucky

On April 3rd 2007, the 33 year anniversary of the 1974 "Super Outbreak", a powerful spring storm moved through Eastern Kentucky bringing damaging straight line winds, some large hail, and five confirmed tornadoes. Most of the damage occurred in the southern part of the Bluegrass State. The hardest hit locations in the Jackson NWS county warning area were Harlan, Pulaski, Laurel, Clay, Whitley, Leslie, and Knox counties. Along with many trees snapped or uprooted, numerous buildings were reported heavy damage all across the state of Kentucky.

There was one confirmed tornado in Laurel county which was rated EF1 and to have had winds estimated at 105 miles per hour. The damage started about 5 miles east of London along highway 80, and continued east southeast for about 2 miles. There were lots of trees snapped and twisted in a convergent pattern, which was evidence of rotation. A wood frame pole barn was demolished, and a well-anchored trailer was moved off its foundation. Also, a store roof was detached from the frame of the building then set back down in place. Tom Johnstone, the Warning Coordination Meteorologist at the Jackson National Weather Service Office, believed that the tornado was embedded in a wide path of straight line winds. Most of the damage was oriented in a straight southwest to northeast pattern. However, on the north end of the damage path there were strong signs of convergence and rotation. This tornadic signature is known as a "book end vortice" and is common with squall line events. This tornado damage survey was the first to implement the new Enhanced Fujita damage scale for the Jackson NWS office.

Picture 1

There were two confirmed tornadoes in Pulaski county. The first tornado traveled less than a mile inside the Pulaski county line from Casey county. This tornado was rated EF1. The tornado tore the roof off

Storm of the Season (Cont.)

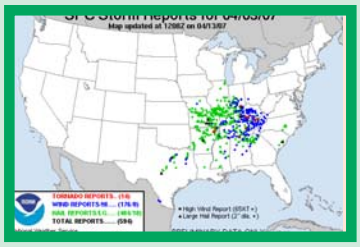
By: Brian Schoettmer
Meteorological Intern

of a barn and just missed the Somerset NOAA Weather Radio broadcast tower. The second tornado was a very brief EF1 with winds estimated at 90 miles per hour. This twister touched down in a wooded area about 1 mile southeast of Hogue and snapped large trees in a short period of time. The path length was a tenth of a mile long and the path width was 25 yards.

Two confirmed tornadoes in Harlan county were the first to ever be recorded in the county's history. The first tornado ripped through the south side of Harlan on U.S. Highway 421. A couple of buildings in the area suffered structural damage, (see picture 2), and the tornado just missed a lot full of school buses. This tornado was rated EF0 with winds estimated around 80 miles per hour. The second tornado occurred on highway 1137 just north of Popeville, where numerous trees and buildings were damaged. This tornado was rated EF0 with winds estimated at 75 miles per hour.

Picture 2

In some instances, the straight line wind damage proved to be more significant than the weak tornadoes that touched down. In Pulaski county, the top of a silo was ripped off and thrown about a half mile to the southeast by straight line winds. In another instance in Harlan county, part of the roof of a hospital was blown off; landing where a group of people had been standing minutes before. These are prime examples of why the National Weather Service wants the general public to take severe thunderstorm warnings just as seriously as tornado warnings. It is important to understand that straight line winds can produce damage that is as intense as weak EF2 damage. This puts winds close to 115 miles per hour!



Picture 3

Eastern Kentucky was not the only area to be ravaged by the storms. The entire Ohio River Valley as well as many southern states felt the impact. The Storm Prediction Center received storm reports for areas in 16 different states. Nationwide, there were 14 tornadoes reported, 176 damaging wind events, and over 400 hail reports overall. The highest concentration of wind reports and tornadoes were centered over eastern Kentucky. Overall, the National Weather Service office in Jackson, Kentucky issued 43 warnings. There were 38 severe thunderstorm warnings, with a few counties that were warned more than once. There were four tornado warnings and one flash flood warning. The average lead time for the severe thunderstorm warnings was 28 minutes. For more information on the Enhanced Fujita scale, go to

http://www.spc.noaa.gov/faq/tornado/ef-scale.html.

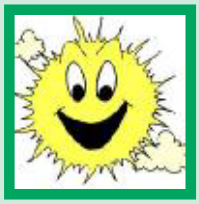
Hydrology

By: Peter Geogerian
General Forecaster

AHPS Workshop hosted at Jackson, KY

On April 17th, Wendy Pearson and Jayant Deo from Central Region Headquarters hosted the Advanced Hydrologic Prediction System (AHPS) Workshop at your Weather Forecast Office in Jackson, Kentucky (WFO JKL). Additional presenters included Tom Adams from the Ohio River Forecast Center (OHRFC), and Mike Deweese from the North Central River Forecast Center (NCRFC). Attendees included Mike Callahan, Service Hydrologist at WFO Louisville, Fred Rogers, Estill County Emergency Manager (EM), Paul Wilson, Bell County EM, Eugene Barrett, Lee County EM, and Gary McClure, Johnson County EM as well as Shawn Harley, Meteorologist-In Charge (MIC), WFO JKL, Jon Pelton, Lead Forecaster, WFO JKL, and Pete Geogerian, General Forecaster and Hydrology Program Manager, WFO JKL.

The purpose of the workshop was to provide training not only to National Weather Service staff members, but also other individuals who make decisions about the dangers that floods and droughts pose to communities. The content of the workshop included AHPS Opportunities and Challenges – A Social Science Perspective, which discussed maintaining a good perspective on who uses AHPS and how it can be improved to meet universal needs of its diverse customers, AHPS Ensemble Stream flow Prediction Analysis and Display Program (ESPADP) Training, which discussed technological advancements made in stage prediction, as well as a usability exercise, which helped assess the usability of AHPS by some of its customers. For more information about AHPS, go to http://www.weather.gov/ahps/ or just left click AHPS/River Info under the menu, Rivers/Hydrology, on the left side of our home page, http://www.weather.gov/jacksonky .



Visit us on the web at:

www.weather.gov/jacksonky

Weather Safety

By: William Modzelewski
General Forecaster

With the recent tornadoes and flooding that have occurred in Eastern Kentucky, it reminds us that all types of severe weather are possible in our area. Knowing how to stay safe in these weather situations can help save your life.

NOAA Weather Radio is one way to keep up to date on the latest weather forecasts, watches, warnings, and current conditions. Using a weather radio with an alert feature, you can receive watches and warnings as soon as they are issued by the National Weather Service. This is the best way to get National Weather Service watches and warnings immediately after they are issued. Another way to get the latest weather information is to check our internet web site at weather.gov/jacksonky. In addition to watches and warnings, you can check the latest forecasts, radar data, and a wide variety of other weather information.

With the recent tornadoes that occurred in our area, it is important to know how to stay safe if a tornado threatens your area. When you hear that a tornado warning has been issued for your area, seek shelter immediately. The safest place to be during a tornado is in your basement. If you do not have a basement, seek shelter in an interior room on the lowest floor of your home away from windows, such as a closet or bathroom. If you are caught outside or in your car, try to find shelter in a sturdy building. If none is available, seek shelter in a ditch or culvert, not under a highway overpass. Do not try to outrun a tornado in your car. If you live in a mobile home, monitor the latest forecasts, watches and warnings. If you hear a tornado watch is in effect for your area, try to spend some time at a friend or family member's home until the watch is over.

Due to the terrain of Eastern Kentucky, our area is especially prone to flash flooding. Flash floods occur quickly. If you see a flooded roadway, do not drive your vehicle through it. Remember, "Turn around, don't drown". Flash flooding occurs quickly, while general flooding is a longer term event that can last several days or more. Both can be very dangerous. You should know an evacuation route if flooding occurs, and move to higher ground. Follow instructions given by local authorities.

Severe thunderstorms also pose a danger. Strong winds can bring down trees, tree limbs and power lines, and cause structural damage. Hail the size of pennies or larger can cause damage to buildings, cars, and crops. Large hail can also injure humans or animals. During a thunderstorm, the safest place to be is in an interior room of your home or business, away from windows. Lightning is a danger in any thunderstorm. If you are outside and hear thunder, then you are close enough to the storm to be struck by lightning. Lightning can strike several miles away from a storm, and you can be struck by lightning even if it is not raining. Get inside a building, and stay away from windows.

Please visit our web site, listen to NOAA Weather Radio, or give us a call at 606-666-8000 for the latest weather information.

Climate Summary

By: Jeff Carico
Hydrometeorological Technician

Winter Season 2006- 2007

The winter season of 2006-07 saw warmer than normal temperatures along with much drier than normal conditions. Even though February 2007 was the coldest February ever at Jackson, the warmer than normal December and January helped the winter season finish up just over one degree above normal. The London Corbin Airport saw its second coldest February, but an above normal December and January helped winter end up over two degrees warmer than normal. Abnormally dry conditions continue to plague Eastern Kentucky, with Jackson ending the winter season nearly five and a half inches below normal, and London almost six and a quarter inches drier.

The Jackson Weather Office ended the season with a maximum average temperature of 46.5 degrees and a minimum average temperature of 29.2 degrees. The mean temperature for winter 2006-07 was 37.8 degrees which is 1.1 degree above the normal temperature of 36.7 degrees. The winter of 2006-07 was the 14th warmest on record since the Jackson Weather Office opened in 1981. Jackson recorded only 6.06" of precipitation during the winter season which is 5.45" below the normal of 11.51". Jackson also received 10.1" of snow during the same timeframe. Jackson normally sees 18.9" during the winter months of December, January, and February.

The London-Corbin Airport finished winter with an average temperature of 39.5 degrees which is 2.3 degrees above the normal of 37.2 degrees. London had a maximum average of 50.0 degrees with a minimum average of 29.1 degrees. London's winter of 2006-07 tied as the 8th warmest winter since climate records began in 1954. London received only 5.83" of precipitation through December, January and February which is 6.21" drier than the normal of 12.04". The winter of 2006-07 was the 3rd driest winter at London. No snow data is recorded at the London Corbin Airport.

Warnings by County

By: Tom Johnstone
Warning Coordination Meteorologist

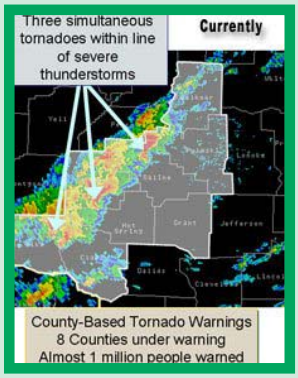
The National Weather Service (NWS) mission is "the provision of weather forecasts and warnings for the protection of life and property and the provision of weather information for the nation's economic well-being". We currently issue and disseminate warnings for tornadoes, severe thunderstorms, flash floods and marine hazards using geopolitical boundaries (counties) across eastern Kentucky. Realizing the continuing need to improve the specificity and accuracy of our warnings, the NWS will implement **Storm-Based Warnings** on October 1, 2007

Storm-Based Warnings (or threat-based polygon warnings), are essential to effectively warn for severe weather. **Storm-Based Warnings** show the specific meteorological or hydrological threat area and are not restricted to geopolitical boundaries. By focusing on the true threat area, warning polygons will improve NWS warning accuracy and quality. **Storm-Based Warnings** will promote improved graphical warning displays, and in partnership with the private sector, support a wider warning distribution through cell phone alerts, pagers, web-enabled Personal Data Assistants (PDA), etc.

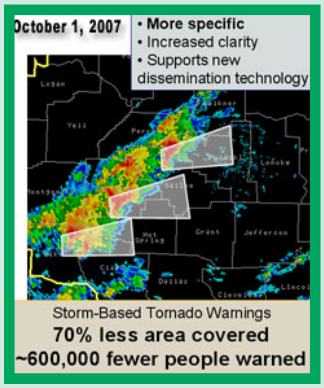
So does this mean you'll have to change the way you receive the NWS warnings? Absolutely not! **Storm-Based Warnings** are simply an enhancement to the way warnings are issued, and all of the legacy dissemination methods will remain in place.

NOAA All Hazards Weather Radio will remain your fastest and most reliable method to receive our warnings. Since warnings will now be threat based and not county based, there will be times when coincident warnings will be in effect for different parts of your county at the same time. For this reason, you will probably notice on the radio that much more detailed geographic information is included in the warnings.

Weather is not affected by county boundaries and effective October 1st, neither will the NWS' warnings. The idea behind **Storm-Based Warnings** is to reduce false alarms by warning only cities and towns to be affected by a particular storm threat. Even though **Storm-Based Warnings** won't become official until October, we already are including the polygon information in our warnings. You can view the threat boxes via our "Ridge" radar display page at http://radar.weather.gov/radar.php?rid=jkl



The image on the left shows how the warnings are displayed now. The image on the right shows how they will be displayed beginning October 1st.



We are currently looking for pictures of the 1939 Frozen Flood, the 1957 Flood and the 1977 Flood that impacted eastern Kentucky, if you have pictures from these floods that you would like to share with us, please send the webmaster an email at w-jkl.webmaster@noaa.gov, or call: (606) 666-8000.

Aviation

By: Brian Schoettmer, Met. Intern
& Dustin Harbage, Lead Forecaster

What a Pilot Should Know About General Thunderstorms

One of the more common threats to a pilot in Eastern Kentucky is the general summertime thunderstorm or "pulse" thunderstorm. What may be a brief downpour and a few rumbles of thunder for the general public can be quite a significant event for a pilot. General thunderstorms, which are caused by intense surface heating lifting parcels of air to a point where they can become thunderstorms, are capable of producing dangerous conditions for an aircraft and pilot. The main threats of a general thunderstorm to aircraft are small hail, wind gusts near severe criteria, and lightning. Also, severe to extreme turbulence is a condition found in any thunderstorm updraft or downdraft, whether the storm is severe or not. It is important for a pilot to be aware of the environment they are about to fly into. What may seem like a fair weather day, can quickly turn into a sky filled with the dreaded towering cumulus and cumulonimbus.

There are quite a few differences between a severe thunderstorm and a general thunderstorm; however, this does not make a general thunderstorm any less dangerous to a pilot. The main difference between the two types of storms is that general thunderstorms lack enough wind shear (change in wind speed and direction with height) to sustain their updrafts. In almost all cases, there has to be sufficient wind shear for a thunderstorm to obtain severe criteria. There are a few instances where a general thunderstorm can produce severe conditions very briefly. The nature of the name "pulse" thunderstorm comes from the fact that the storm updraft develops quickly and then dies out just as fast. Once the cloud starts to produce precipitation, there is not enough wind to carry the rain away from the updraft. This causes the updraft to be "choked off" by the rain cooled air and the result is a collapsing thunderstorm. At this point in the thunderstorm lifecycle, it is capable of producing strong to marginally severe downburst winds. The severe thunderstorm differs in the simple fact that there is more wind shear that helps the storm stay "alive" long enough for the storm to organize and produce a severe event. If a storm has a chance to organize, it is going to be able to produce more powerful winds and larger hail. However different the two types of storms may be, the bottom line is that both are capable of producing conditions that can be hazardous to small airplanes and the pilots flying them.

The National Weather Service routinely issues 24-hour forecasts for airports in their area. These **T**erminal **A**erodrome **F**orecasts, or **TAF**'s, are designed to reflect current conditions and forecast conditions for airports in a real-time fashion. The airport conditions are constantly monitored by aviation forecasters, and amended as necessary due to changing conditions. It is important for a pilot to understand that if a TAF mentions thunderstorms in the vicinity, this could mean different things. When this kind of statement is issued it means that there could be thunderstorms within the general area of the airport at any time in the forecast period. Whether the storm is right over the airport, in the departure path, or just in the area of the airport is not all the pilot should be concerned about. A thunderstorm has the potential to toss hail out of its updraft or anvil for great distances. Also, lightning can strike as much as ten miles away from the thunderstorms. Other dangers associated with a thunderstorm in your "vicinity" are low level wind shear associated with outflow, and deteriorating visibility associated with lowering ceilings and rain showers.

The goal of National Weather Service aviation forecasters is to provide pilots with as much information as possible, so that a pilot can make a good decision about the conditions he/she is about to fly in. There are many products issued by the NWS designed specifically for general aviation pilots to use. There is an aviation section in the **A**rea **F**orecast **D**iscussion (AFD) that is provided at least 8 times a day by the National Weather Service that gives pilots information about conditions around the region. The Aviation Weather Center in Kansas City, Missouri provides a link to all available AFD's around the nation. (aviationweather.gov/testbed/afd/) The Jackson, KY NWS Forecast Office also has a brand new aviation weather website that has many tools available to a pilot. The link to this new website is as follows: www.crh.noaa.gov/jkl/?n=aviation. One useful feature that this new and improved website has, allows pilots to point and click on other airports that are not included with official TAF's and get valuable aviation weather information.

Armed with better knowledge and better tools, pilots will be able to know what kind of environment is going to be around them when they fly. As summertime draws near and that "itch" to go flying increases with each beautiful day, we urge you to familiarize yourself with our products. This way when the time comes to fly, the decision will come with the best

Visit us on the web at:

http://www.weather.gov/jacksonky

Tech Tips

By: Edward Ray
General Forecaster

CLOUD BASE CALCULATOR (best when used with fair weather cumulus clouds):

Have you ever wondered how high up the clouds are? Well, you can actually calculate an approximate height of a cloud base using the temperature and dew point of the air at the surface. The formula is based on the lapse rateof the temperature and dew point, or the rate at which air cools when lifted. The lapse rate is about 4.4 to 4.5 degrees with each 1000 ft increase in height. Using this knowledge, one can calculate the height to the bottom of the cloud above the ground.

Formula :

((Temperature – Dew point temperature) / 4.4) * 1000 (ft) = height above the ground

The following tables are presented for quick reference:

FAHRENHEIT TABLE

CLOUD BASE CALCULATOR		CLOUD BASE CALCULATOR		CLOUD BASE CALCULATOR	
$T - T_d$ (◦F)	Cloud Base Height ○	$T - T_d$ (◦F)	Cloud Base Height	$T - T_d$ (◦C)	Cloud Base Height
1	225	34	7640	1	405
2	449	35	7865	2	808
3	674	36	8090	3	1213
4	899	37	8315	4	1618
5	1124	38	8539	5	2023
6	1348	39	8764	6	2426
7	1573	40	8989	7	2831
8	1798	41	9213	8	3236
9	2022	42	9438	9	3640
10	2247	43	9663	10	4045
11	2472	44	9888	11	4450
12	2697	45	10,112	12	4855
13	2921			13	5258
14	3146			14	5663
15	3371			15	6068
16	3596			16	6473
17	3820			17	6876
18	4045			18	7281
19	4270			19	7686
20	4494			20	8089
21	4719			21	8494
22	4944			22	8899
23	5169			23	9304
24	5393			24	9707
25	5618			25	10,112
26	5843				
27	6067				
28	6292				
29	6517				
30	6742				
31	6966				
32	7191				
33	7416				

CELSIUS TABLE

Weather History

By: Tabitha Brewer
Administrative Support Assistant

Each year, eastern Kentucky is faced with numerous floods and flash floods. There are three floods in particular that stand out as the most devastating floods eastern Kentucky has experienced: those floods occurred in 1939, 1957, and 1977.

The 1939 flood, also called the Frozen Creek Flood, was perhaps the most devastating. This flood occurred during the night of July 4 -5, 1939. The storm lasted only a short time, but was extreme in intensity. Although the storm began late in the evening of July 4th, it reached maximum intensity during the early morning hours of July 5th and stopped before daybreak. The downpour resulted in rainfall depths that exceeded any previous known for such a short period of time in Kentucky. Reliable measurements were not available, but according to local residents, rainfall exceeding 12 inches, and possibly close to 20 inches occurred at the center of the storm.

After the flood -- Frozen, KY

The area affected by the flood was almost 1,000 square miles, and was comprised of Breathitt, Carter, Elliott, Lewis, Morgan, Rowan and Wolfe counties. The majority of the damage occurred in Breathitt County- Frozen Creek and Rowan county- Morehead. The storm began in Morehead around 11 p.m. on the 4th. The normal stream channel of Triplett Creek overflowed and rose at an even rate for the next two hours, until it crested. One observer estimated a rise of 7 feet in 11 minutes.

The sudden rise of Frozen Creek was described as even more abrupt, almost immediate and that it was more of a flood wave than a rise of water. Since the flooding occurred at night, it caught many families unprepared. In the Frozen community of Breathitt County, there was only a small amount of tillable land, families lived in the narrow valleys near the streams where crops could be planted. The rush of water down the valley was sudden and of great intensity, having the appearance of a great wall of water, similar to what you would expect to see when a dam breaks. Unofficial reports estimate that in some places the wall of water was approximatly 22 feet in height. This wall of water swept homes off their foundatins and down the valley, totally destroying homes, contents and in many cases, killing the inhabitants. There was no time for evacuations, or even warnings. The wall of water not only destroyed homes, but barns, and any other structures in its path.

After the flood -- Frozen, KY

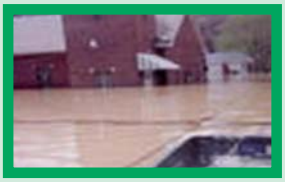
A total of 79 people lost their lives, 52 in Breathitt county, 25 in Rowan county and 2 in Lewis county. Those that survived were not the fortunate ones. They lost their homes, members of their families and their source of survival. Crops and livestock were destroyed. Rock, sand and debris was washed over tillable acres, rendering them useless for farming for up to a year, and in some instances, much longer. The damage resulting from the flood was estimated at nearly $2,000,000. In 2006 currency, this event would have cost $27,667,248.85.

Hazard, KY

In 1957, devastating floods occurred on the streams of southeastern Kentucky, West Virginia and northeastern Tennessee during the period of January 27th – February 2nd. It is estimated that 12 1/2 inches of rain was received at the eastern end of the Virginia-Kentucky State line. The principal basins affected by the strom were those of the Big Sandy, Kentucky, Cumberland and Tennessee Rivers. The heaviest rainfall during this period in Kentucky occurred in the Pikeville-Haysi area and ranged from 6 to 9 inches. The area of severest flooding was in Kentucky due to our narrow, deep valleys. The flooding was so rapid that many residents had to flee their homes without any belongings. Communication was disrupted in many areas so no flood warning was received. Food shortages developed due to damages to stores and water supplies in some cities and towns were contaiminated. There was no gas for cooking. Phone lines and electirc power was out. At least 30 State and Federal highways were blocked by high water or slides. Most roads above flood level were rendered impassable as well. Pike County suffered the greatest loss with damage exceeding $15 million.

On January 29th, President Eisenhower declared 18 counties in Kentucky disaster areas. Those counties were: Bell, Breathitt, Clay, the City of Corbin, Estill, Floyd, Harlan, Johnson, Knott, Knox, Lee, Leslie, Letcher, Martin, Owsley, Perry, Pike and Whitley. Nine people lost their lives in Kentucky. Total expenditures for this event totaled $61,000,000; $52,000,000 of which occurred in Kentucky. In 2006 currency, this event would have cost $438,187,655.

In 1977, torrential rains fell from April 2nd – 5th, causing record flooding in southeastern Kentucky along the upper Cumberland River basin, the Tug Fork and Levisa Fork, both tributaries to the Big Sandy River, Russell Fork, a tributary to Levisa Fork, and along the North Fork of the Kentucky River. In the Cumberland River basin, the flood exceeded previously known discharges at 8 gaging stations and was second greatest at 2 other gaging stations. Poor Fork, the main headwater tributary of the Cumberland river, crested at 15.88 ft.



Prestonsburg, KY

Weather History (Continued)

By: Tabitha Brewer
Administrative Support Assistant

On the main stem of the Cumberland River in Kentucky, peak discharges were the greatest recorded at Harlan, Pineville, and Barbourville. On April 4th, levees and the floodwall at Pineville were overtopped and the city was covered with 15ft. of water. Barbourville was evacuated as a precautionary measure.

On April 6, 1977, President Jimmy Carter declared 15 Kentucky counties as disaster areas. These counties were: Bell, Breathitt, Floyd, Harlan, Johnson, Knott, Knox, Lawrence, Leslie, Letcher, Magoffin, Martin, Perry, Pike and Whitley.

According to the Red Cross there were 10 people killed, 2,255 injured or affected by illness, and 132 hospitalized in these counties. There were 22 people killed in the 4 state area of Kentucky, Virginia, West Virginia and Tennessee. Total expenditures for this event totaled $175,137,081 in 1977. In 2006 currency this event would cost almost 600,000,000.

Do You Know? Children, Elderly, Pets & Vehicles

By: Bonnie Terrizzi
Hydrometerological Technician

It is summertime, and so far this year across the United States, there have been at least seven deaths of small children after being left inside a vehicle that quickly turned into a hot oven. In 2005, there were 42 child fatalities due to hyperthermia after being left in hot cars, trucks, vans, and SUVs. Some of these deaths occurred on days with relatively mild temperatures of less than 75 degrees. Since 1998, there have been at least 290 of these needless tragedies. There are unknown amounts of pet deaths or of heat stroke with the elderly brought on by being left in hot cars as those statistics are not tracked.

Several university, medical and governmental studies have produced some sobering statistics. Heatstroke occurs when the core body temperature reaches 104 degrees F. A core body temperature of 107 degrees F is considered lethal. Children's thermoregulatory systems are not as efficient as an adult's and their bodies warm at a rate 3 to 5 times faster than an adult's. Likewise, the elderly loose their ability to regulate heat and will succumb quickly to high temperatures.

In studies of temperature rises within an enclosed vehicle, the average temperature rise was 19 degrees above the outside ambient temperature within 10 minutes elapsed time. In 20 minutes, there was a 29 degree rise. 30 minutes equaled a 34 degree rise, and after 60 minutes, the average climb was 43 degrees. In other words, 80% of the heat rise occurs within the first 30 minutes. Cracking the windows a few inches had very little effect, with the average total cooling effect of only 2.3 degrees. Interestingly, windows all the way down only reduce the overall heat rise by only 11 degrees in direct sunlight. Cars with dark interiors have a higher temperature climb than those with light colored interiors. Higher humidity levels compound the extreme heat levels by further reducing the body's natural ability to cool itself as evaporation of sweat slows.

On an average summer day with 85 degrees outside, within 10 minutes the parked car will rise to 108 degrees F. With 50% humidity, that equates to an equivalent temperature of 144 degrees F. With the windows all the way down, this 10 minute errand still translates into the inside car temperature of 97 degrees with a heat index for humidity creating an equivalent temperature of 110 degrees F. And that is within 10 minutes. How long does it take to go inside a grocery store to pick up a loaf of bread and a gallon of milk, pay, and return to the car? Chances are, more than 10 minutes will elapse for this "brief" errand. Within 60 minutes, the internal temperature of this parked car will reach 128 degrees, and with the heat index factored in, the equivalent interior temperature of the parked car reaches an astounding 238 degrees! Water will boil at 212 degrees! Even on relatively "cool" days when the outside ambient temperature is 72 degrees, the internal vehicle temperature will rise to 117 degrees F within 60 minutes for a vehicle parked in the sun. Eighty percent of that rise occurs within the first 30 minutes.

Heat illness is a condition that is divided into 3 phases. The mildest form is heat stress when the body is reaching a level of serious discomfort and a physiological strain, but no real lasting effect. The second phase is heat exhaustion which is classified as a mild to moderate illness associated with dehydration and a core body temperature ranging from 98.6 to 104 degrees F. Symptoms of heat exhaustion include intense thirst, weakness, discomfort, anxiety, dizziness, fainting, and headache. Finally, heat stroke is the third and final stage of heat illness. Heat stroke is a life-threatening illness characterized by an elevated core body temperature in excess of 104 degrees F with central nervous system dysfunction resulting in delirium, convulsions, coma, and death. Immediate medical attention is required.

Studies have indicated various reasons people have given for leaving children unattended in parked cars. In an analysis of child hyperthermia fatalities of 117 deaths between 1995 and 2002, the circumstances that led to the fatalities were examined. Researchers found that in 39% of the cases, the child was "forgotten" by the caregiver. 27% were because the child was playing in an unattended vehicle and the parents or caregiver was unaware of the danger. 20% were intentionally left in the vehicle by an adult running a quick errand, and 14% were from unknown or unclear circumstances.

This summer, do not allow your loved one to become a part of summer tragic statistic. Do not leave anything in a parked car that can be affected by the extreme heat. In addition to children, this includes pets, the elderly, or anyone who may have difficulty in leaving the car when the heat level becomes uncomfortable, such as a handicapped individual. Even leaving a parked car with the motor and air conditioning running is not a wise option. Most condensers in car air-conditioning systems will not engage when the car is parked for more than just a few minutes. In addition to posing risk of children placing the car into gear, or inviting thieves to help themselves to your car, you will have increasingly hot air blow in by an increasingly ineffective air conditioning system.

NOAA's charting piece, which evolved into the National Ocean Service (NOS), began at the turn of the 19th century when President Thomas Jefferson, a true NOAA pioneer, established the first science agency of the United States: the Survey of the Coast. The Survey of the Coast changed its name to the Coast and Geodetic Survey in 1878 to reflect the role of geodesy. Today NOS still helps people find their position on the planet by managing the National Geodetic Survey, which specifies latitude, longitude, height, scale, gravity and orientation throughout the nation. Aviation safety, in particular the orientation of runways, depends on this system. NOS has been a leader in the introduction of electronic nautical charts which, together with GPS, has enhanced the safety and efficiency of navigation on the nation's waterways.

More than a century later NOS has evolved into the nation's principal advocate for coastal and ocean stewardship. As the trustee for 12 marine protected areas, NOAA protects National Marine Sanctuaries, which are akin to national underwater parks. Each sanctuary has a unique goal. While one may protect the breeding ground of humpback whales, another preserves the remains of historical shipwrecks, and still another protects thriving coral reef colonies

Before the Revolutionary War, Thomas Jefferson acted as an unofficial weather bureau, collecting records from such distant points as Quebec and from as far west as the Mississippi. Today, NOAA's cooperative weather observers, comprising a network of more than 10,000 National Weather Service (NWS) volunteers across the country, continue the tradition of taking daily weather measurements that become part of our climate records. These records, along with other records from the NWS, U.S. Navy, U.S. Air Force, the Federal Aviation Administration, and meteorological services around the world are housed at the National Climatic Data Center in Asheville, N.C. The center, the largest active archive of climate data in the world, is part of NOAA's National Environmental Satellite, Data and Information Service. In addition to the climate center, NESDID also operates the National Geophysical Data Centre in Boulder, CO., and the National Oceanographic Data Center in Silver Spring, MD. Scientists from around the world use data from these centers to study our environment.

When Congress transferred weather services from the Army to the new Department of Agriculture in 1890, the Weather Bureau, a new civilian weather service and ancestor of NOAA's NWS, was born. By the end of the century, the Weather Bureau published its first Washington, D.C. weather map (1895), established the first hurricane warning service (1896) and began regular kite observations (1898). Today's NWS uses complex technologies such as weather satellites, Doppler radar, automated surface observing systems, sophisticated computer models, high-speed communications systems, flying meteorological platforms, and a highly-trained and skilled workforce to issue more than 734,000 weather and 850,000 river and flood forecasts, and between 45,000 and 50,000 potentially life-saving severe weather warnings annually.

The fishing industry has been important to the U.S. since its earliest days. NOAA's National Marine Fisheries Service, or NOAA Fisheries, is the direct descendant of the U.S. Commission of Fish and Fisheries, the nation's first federal conservation agency, initiated in 1871 to protect, study, manage and restore fish. Woods Hole, Mass., became home of the first marine fisheries research lab and is still home to one of NOAA's five fisheries science centers.

From 19th century beginnings to more than 30 years as a federal agency, NOAA has evolved into a science agency with conservation management and regulatory responsibilities. The agency looks forward to the challenges ahead while continuing to observe, monitor and collect information about our world in a quest to both protect the environment and improve the human condition.

KID'S CORNER

By: Anthony Richey
General Forecaster

This picture shows a piece of metal that was driven into a healthy tree by a tornado

This picture shows how a vinyl record was embedded in a power pole by a tornado

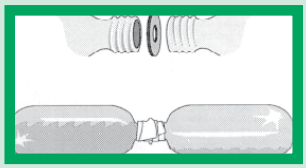
This Picture shows how a fork was stuck into a tree by the winds of a powerful tornado

Amazing Tornado Stories

- On April 1, 1912 in Dickson, Tennessee, a box with a chicken in it was carried 200 yards without harming the chicken!
- On April 22, 1922 a post card was carried from Orestes, Indiana to Wheeling Indiana by a tornado with only a torn corner.
- On May 20, 1949, 13 of 14 cattle were picked up and carried away from their feedlot near Hammon, Oklahoma. The cows were set down unharmed one quarter of a mile away. "The bawling of cattle could be heard in mid-air and tracks could only be seen leading outward from the spot where they landed."
- Tornadoes have been known to pluck the feathers from chickens.
- On November 15, 1915 in Great Bend Kansas, a fire hydrant was found full of wooden splinters after a large tornado had passed. A necktie rack with 10 ties still attached was carried 40 miles.
- In June of 1997 in western Mexico, a small tornado picked up hundreds of toads from a pond and dropped them over the town of Villa Angel Flores.

Make Your Own Tornado

Materials: (2) two liter soda bottles
(1) washer with a 3/8 inch hole
Electrical Tape
Food coloring or bits of paper



Assembly: Fill one bottle about 2/3 full of water. For effect, add either food coloring or paper bits to the water. Place the washer on top of the bottle opening. Place the second bottle on top of the bottle containing the water with the opening against the washer. Tape the two bottles together with the washer between them.

How to create a tornado: With the filled bottle on top, rapidly rotate the bottles in a circle a few times. Place the assembly on a table. Observe the formation of a funnel-shaped vortex as the bottle drains.

What's going on? When you spin the bottles around a few times, the water in the upper bottle starts rotating. As the water drains into the lower bottle, a vortex forms. The water is pulled down and forced toward the drain hole in the center by gravity. The angular momentum of the water stays the same as it moves inward. This means that the speed of the water around the center increases as it approaches the center of the bottle. (http://www.exploratorim.edu)